RF matching and damping at transition

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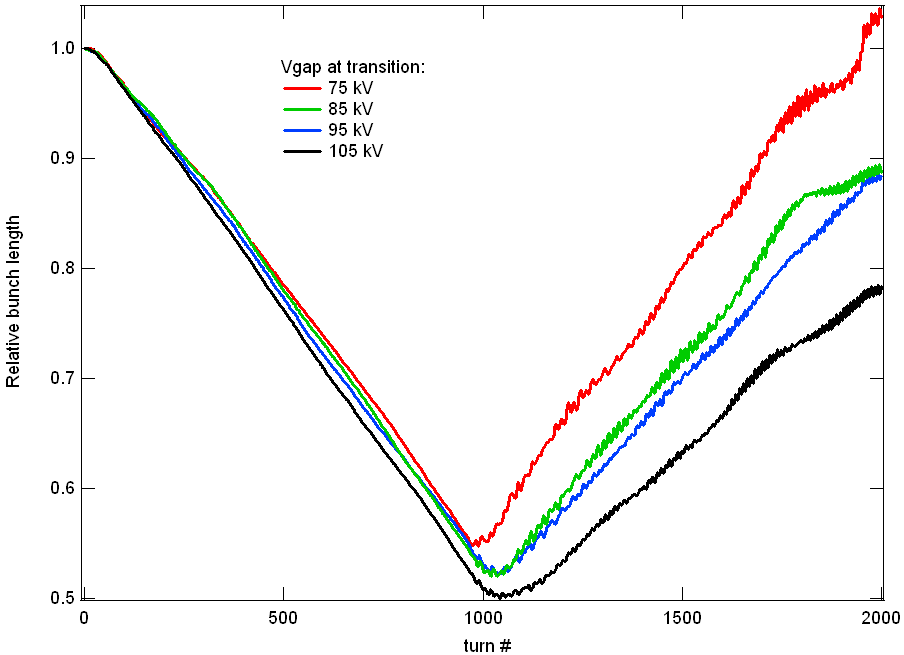
Blue Matching



$$\varepsilon \propto \sigma_t^2 \sqrt{V_{gap}}$$

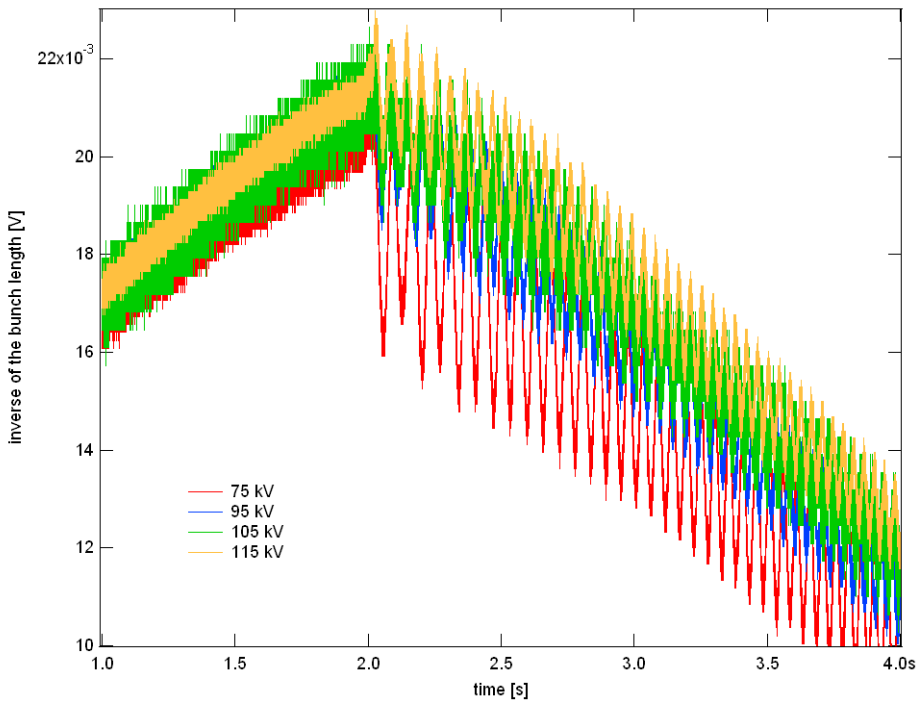
$$\varepsilon_f = k\varepsilon_i$$

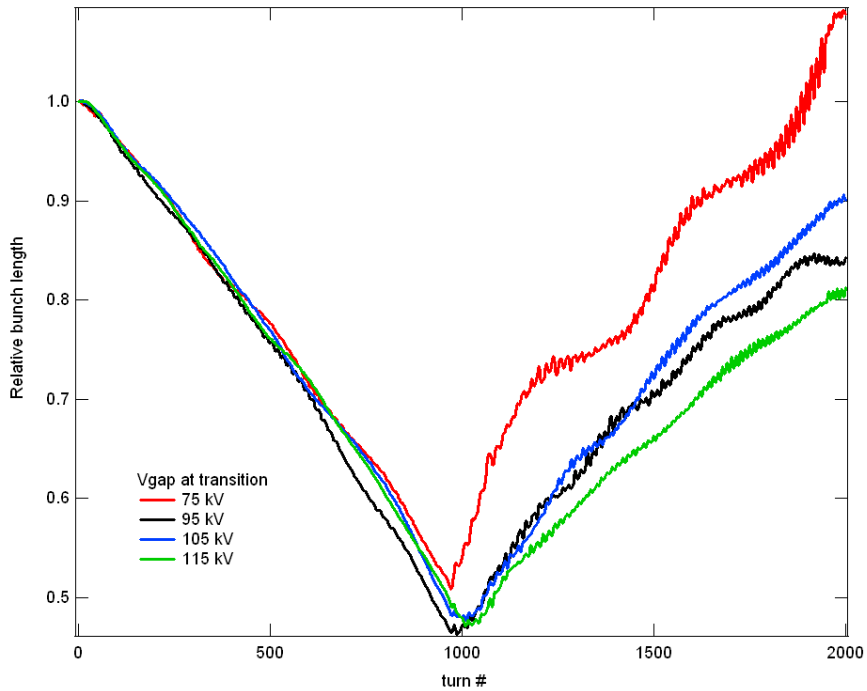
$$\frac{k_N}{k_{DS}} = \left(\frac{\sigma_{f,N}}{\sigma_{f,DS}} \frac{\sigma_{i,DS}}{\sigma_{i,N}} \right)^2 \sqrt{\frac{V_N}{V_{DS}}}$$

Vgap	Before	After	Ratio	Emittance Reduction
75	10.70	7.80	0.73	
85	12.00	6.95	1.73	1.49
95	11.2	6.95	1.61	1.23
105	10.95	7.80	1.40	0.89

Yellow Matching

Vgap	Before	After	Ratio	Emittance Reduction
75	9.82	7.09	0.72	
95	10.00	6.95	1.44	0.96
105	9.75	5.65	1.73	1.31
115	9.75	5.75	1.70	1.21

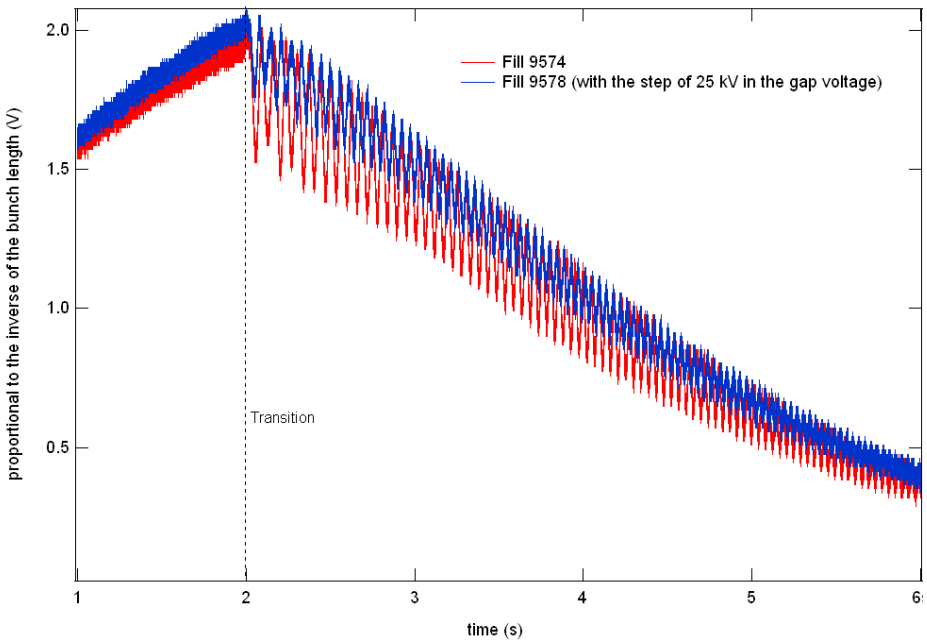




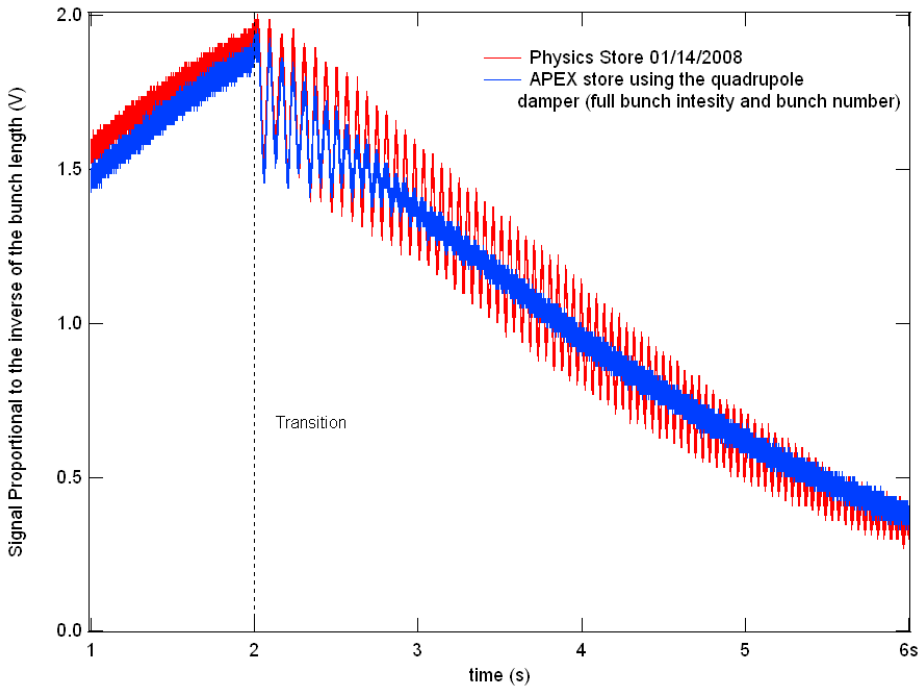
Longitudinal Damper

- Longitudinal emittance -> 36% smaller (max) and on average 10%.

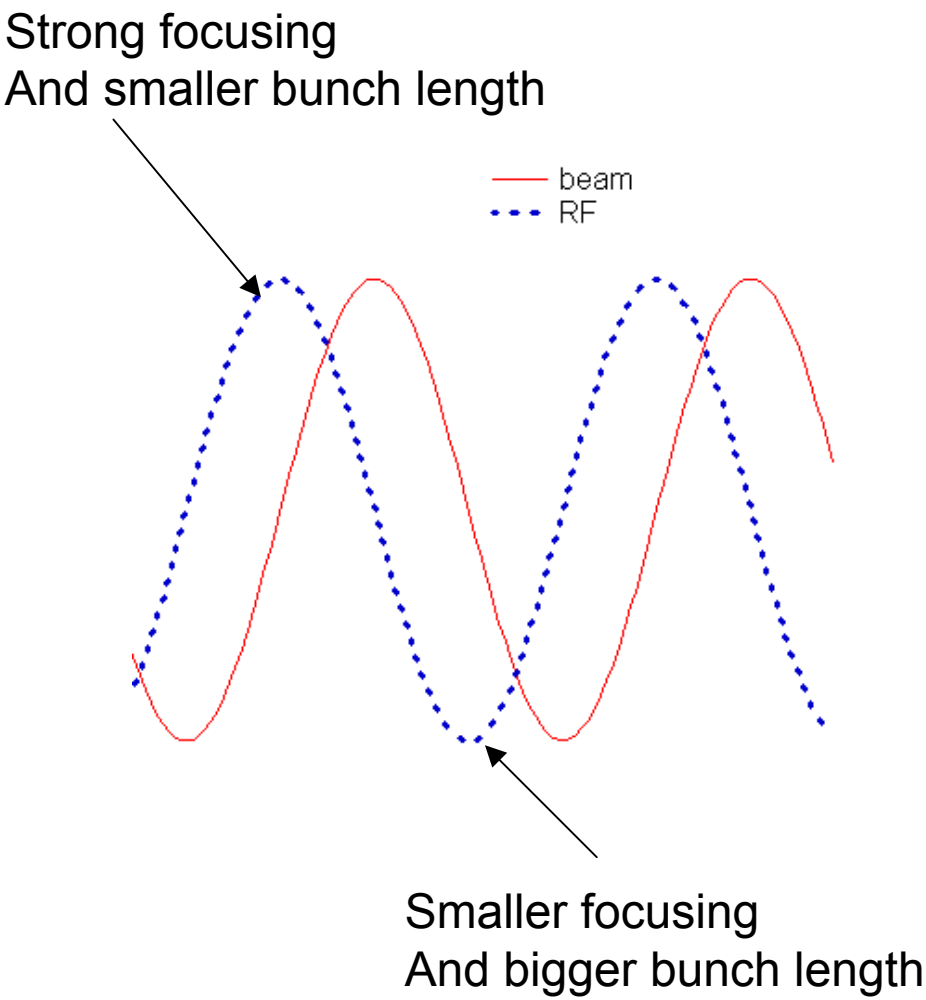
Step in the voltage



Longitudinal Damper



Longitudinal Damper



- The damper only measures the overall bunch oscillations and so it is only able to damp the coherent part of it.
- So far, we are looking at the 4^{th} RF harmonic in the WCM spectrum and so it depends on the total bunch intensity.